Commentary to 'Community-acquired pneumonia due to *Escherichia coli*' by Marrie TJ et al

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How specific is a diagnosis of community-acquired *Escherichia coli* pneumonia, especially when established in elderly persons, many with severe underlying diseases and often admitted to hospital from a nursing home? Do these patients have pneumonia at all, and if so, is the pneumonia really caused by *E. coli*? These are questions that come to my mind when reading the article 'Community-acquired pneumonia due to *Escherichia coli*' by Marrie TJ et al in this issue of CMI (page 717).

The objective of the study by Marrie et al was to describe the features of community-acquired *E. coli* pneumonia and to compare these patients with those who had pneumonia caused by other etiologic agents. The patient sample for this comparison came from the so-called 'Pneumonia Patient Outcomes Research Team (PORT)' study. The main findings of the present study were that an *E. coli* diagnosis could be assigned to 19 of 2287 (0.8%) patients with community-acquired pneumonia (CAP), in nine cases based on a positive blood culture and in 10 cases based on sputum culture findings. *E. coli* patients were frequently bacteremic, and when compared with patients with pneumonia due to other etiologies, they were older, and more often likely to be female, from nursing homes and severely ill. Despite high age, and often severe underlying and acute illness, there was no in-hospital mortality. However, the death rate was 21% after discharge from hospital, within 90 days of presentation.

Clearly, some of these patients had an *E. coli* pneumonia, e.g. the patient in whom the bacterium was isolated from empyema fluid. However, I would advocate some caution against drawing general conclusions concerning the features of *E. coli* pneumonia on the basis of this study.

There are several areas of concern—the representativeness of the patients in whom an etiologic diagnosis was established for the study population as a whole, the specificity of the clinical and radiographic basis for the pneumonia diagnosis, the possibility of sources other than the respiratory tract for *E. coli* bacteremia, and the specificity of the sputum culture findings.

The PORT study was multicenter and focused on different types of outcome parameters, and there was no systematic approach for obtaining an etiologic diagnosis of the pneumonia. Microbiological testing was performed at the discretion of the attending physician, and the laboratory procedures were performed as a part of the routine diagnostic services of each of the participating laboratories. Blood cultures were obtained in 71% and sputum cultures within 24 h from admission in 38% of inpatients (all presumptive *E. coli* pneumonia patients were admitted to hospital). The overall yield of etiologic diagnosis was fairly low, 30%, which implies a risk for a selection bias.

The diagnosis of pneumonia was based on one or more clinical symptoms 'suggestive' of pneumonia and acute radiographic evidence of pneumonia. Respiratory symptoms were less common among patients assigned an *E. coli* pneumonia diagnosis than among those with pneumonia due to other agents, with cough and sputum production present in only eight and nine, respectively, of the 19 patients. Since the *E. coli* pneumonia diagnosis was based on sputum culture findings in 10 patients (although sputum was present in only nine patients), it is unlikely that any of the bacteremic patients had a cough. The radiographic findings were based on an acute chest film indicative of pneumonia (possible, probable, or definite infiltrate) according to a majority opinion of three radiologists. However, according to data from another subset of the PORT study, radiologists disagreed whether an infiltrate was present, or not, in about one of six cases

[1]. Further, when a diagnosis is based only on an acute chest film it is difficult to know if the infiltrate really is 'new' and associated with the suspected pneumonia. Follow-up X-rays showing clearance of infiltrate after antibiotic therapy would have improved the reliability of the radiographic diagnosis.

The low pneumonia-associated mortality is another reason for questioning the pneumonia diagnosis. Almost one half of the patients fell into the highest pneumonia risk group, with an expected mortality at 30 days of 27% [2]. Therefore, the absence of in-hospital deaths is surprising. After 90 days (the 30-day mortality was not stated) four patients had died, but pneumonia was considered as the major cause of death in only one patient. The authors reason that the low mortality was caused by an initial empirical therapy covering *E. coli*. However, if that was correct the same low mortality should have been observed also in patients with pneumonia due to other causes, since the empirical therapy would have covered most (all?) of the pathogens in that group.

Bacteremia is considered the standard for an etiologic diagnosis of pneumonia, but does this really apply also to the isolation of *E. coli*? In a recent prospective US hospital study of bacteremia, common sources of 116 cases of *E. coli* bacteremia were the genitourinary tract, the biliary tract and peritoneal infections, but in no case the respiratory tract [3]. Further, the associated mortality was much lower when the source of infection was the genitourinary tract (11%) rather than the respiratory tract (25%). In the present study, no urinary tract cultures were performed and it is impossible to know if the bacteremia originated from the urinary tract [4]. If that was the case, there may have been a metastatic seeding to the lungs causing a pneumonia, but other more probable options include a simultaneous pneumonia caused by other organism(s), or a urinary tract infection with a non-infectious cause of the chest film infiltrate.

In the present study, sputum cultures were performed irrespective of whether the sample was representative for the lower airways or not, and only semiquantitative culture methods were used. Sputum samples obtained within 48 h from admission were accepted for an etiologic diagnosis. The criteria for a presumptive positive sputum culture included moderate or heavy (not defined) growth of a predominant pathogen, or light growth with a Gram stain compatible with the culture results. However, multiple isolations of the same genus and species within 3 days of admission, irrespective of Gram stain results or the amount of growth, was also accepted. Altogether, *E. coli* was isolated from the sputum of 28 patients within 48 h, but only 10 of those isolates fit the criteria of a presumptive agent (of which three had mixed infections). It is indeed difficult to know if these sputum findings of *E. coli* represented infecting or colonizing bacteria. Had any of these 10 patients been on antibiotic treatment prior to sputum cultures being obtained? Was *E. coli* isolated from the first sputum sample obtained, or had there been a prior culture(s) with negative or other findings? Colonization of the oropharynx or the respiratory tract with Gram-negative enteric bacteria (GNEB) is not uncommon in hospitalized patients and is associated with several factors, e.g. old age and antibiotic therapy [5]. Colonization with GNEB may also develop rapidly in patients admitted to hospital with CAP. In a study of 245 CAP patients, 24% became colonized with GNEB, and in 75% of the cases colonization occurred within 72 h from admission [6].

In conclusion, since there is relative scarcity of reports on the features of patients with presumptive *E. coli* pneumonia, the present study is a valuable addition as a descriptive analysis. However, a more detailed discussion of the many uncertain factors concerning the diagnosis would have been more appropriate, while a statistical comparison between this small group of patients, who may have had an *E. coli* pneumonia, and patients with pneumonia due to other causes seems to be less meaningful.

References

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Response

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